AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (original): An image forming apparatus, comprising:

an image carrier which has an endless shape and rotates in a predetermined direction, to thereby transport an electrostatic latent image which is carried on a surface of said image carrier;

developing means which supplies toner to said electrostatic latent image, visualizes said electrostatic latent image with said toner and accordingly forms a toner image; and

density detecting means which detects a toner density of a toner image which is formed as a patch image, wherein:

while a density control factor, which influences an image density, set to be variable over multiple levels, a patch image is formed at each level of said image forming condition, said density detecting means detects toner densities of said patch images, and said density control factor is optimized based on the detection results; and

a low-density patch image formed under a low-density side image forming condition, which makes an image density the lowest among said multiple levels of said image forming condition, has a length which is equal to or longer than a circumferential length of said image carrier in a patch length direction which corresponds to a direction in which said image carrier moves, said density detecting means detects a density in a portion of said low-density patch

image which corresponds to said circumferential length of said image carrier, and a toner density of said low-density patch image is calculated.

2. (original): The image forming apparatus of claim 1, wherein said low-density patch image has a strap shape which continuously extends in said patch length direction.

3. (original): The image forming apparatus of claim 2, wherein said toner density of said low-density patch image is an average value of toner densities at respective detection positions of said low-density patch image, said detection positions being in said patch length direction and different from each other.

4. (original): The image forming apparatus of claim 1, wherein said low-density patch image is formed by a plurality of patch fragments which are in said patch length direction.

5. (original): The image forming apparatus of claim 4, wherein said toner density of said low-density patch image is an average value of toner densities of said plurality of patch fragments.

6. (original): The image forming apparatus of claim 1, wherein the length along said patch length direction of a high-density patch image formed under a high-density side image

forming condition, which makes an image density the highest among said multiple levels of said image forming condition, is shorter than said circumferential length of said image carrier.

7. (original): The image forming apparatus of claim 1, wherein said surface of said image carrier is formed by a photosensitive member, said electrostatic latent image is formed as a surface of said photosensitive member is exposed with a light beam.

8. (original): The image forming apparatus of claim 1, further comprising bias applying means which applies a predetermined developing bias upon said developing means to thereby move said toner from said developing means to said image carrier, wherein said developing bias is used as said density control factor.

9. The image forming apparatus of claim 1, further comprising an intermediate member which is structured so as to be able to temporarily carry a visualized toner image on said surface of said image carrier, wherein said density detecting means detects a toner density of a toner image which is carried as a patch image on a surface of said intermediate member.

10. (original): An image forming apparatus, comprising:

an image carrier which has an endless shape and rotates in a predetermined direction, to thereby transport an electrostatic latent image which is carried on a surface of said image carrier;

developing means which supplies toner to said electrostatic latent image, visualizes said electrostatic latent image with said toner and accordingly forms a toner image; and

density detecting means which detects a toner density of a toner image which is formed as a patch image, wherein:

while a density control factor, which influences an image density, set to be variable over multiple levels, a patch image is formed at each level of said image forming condition, said density detecting means detects toner densities of said patch images, and said density control factor is optimized based on the detection results;

at least one or more of said patch images has a length along said patch length direction, which corresponds to a direction in which said image carrier moves, is equal to or longer than said circumferential length of said image carrier; and

said toner densities of said patch images are found as said density detecting means detects densities in portions of said patch images which correspond to said circumferential length of said image carrier.

11. (currently amended): An image forming method in which an electrostatic latent image is formed on a surface of an image carrier which is formed in an endless shape and rotates in a predetermined direction, toner is supplied to said electrostatic latent image, said electrostatic latent image is visualized with said toner, and a toner image is accordingly formed, said method comprising the steps that:

while a density control factor, which influences an image density, set to be variable over multiple levels, a patch image is formed at each level of said image forming condition, ~~said~~ a density detecting means detects toner densities of said patch images, and said density control factor is optimized based on the detection results; and

a low-density patch image formed under a low-density side image forming condition, which makes an image density the lowest among said multiple levels of said image forming condition, has a length which is equal to or longer than a circumferential length of said image carrier in a patch length direction which corresponds to a direction in which said image carrier moves, said density detecting means detects a density in a portion of said low-density patch image which corresponds to said circumferential length of said image carrier, and a toner density of said low-density patch image is calculated.

12. (original): The image forming method of claim 11, wherein:

a predetermined developing bias is applied upon developing means, said toner is made move to said image carrier from said developing means, and said electrostatic latent image is visualized with said toner; and

said developing bias is used as said density control factor.

13. (original): An image forming apparatus, comprising:

an image carrier which carries an electrostatic latent image on a surface of said image carrier;

a toner carrier which transports toner carried on a surface of said toner carrier to a developing position facing said image carrier, while rotating in a predetermined rotation direction; and

control means which moves said toner carried on said surface of said toner carrier to said image carrier while feeding said surface of said image carrier which carries said electrostatic latent image to said developing position, to thereby visualize said electrostatic latent image with said toner and accordingly form an image, wherein:

said control means controls an image forming condition based on an image density of a patch image which is formed in a patch image area on said image carrier; and

while said patch image area moves passed said developing position, said toner carrier rotates one round or more.

14. (original): The image forming apparatus of claim 13, wherein said control means controls said image forming condition based on an image density within an area of said patch image which moves passed said developing position while said toner carrier rotates one round.

15. (original): The image forming apparatus of claim 13, wherein said control means applies an alternating voltage upon said toner carrier and makes said toner carried by said toner carrier transfer toward said image carrier.

16. (original): The image forming apparatus of claim 13, wherein said toner carrier is disposed facing said surface of said image carrier with a predetermined gap from said surface of said image carrier.

17. (currently amended): An image forming apparatus, comprising:

an image carrier which carries an electrostatic latent image on a surface of said image carrier;

a toner carrier which transports ~~said~~ toner carried on a surface of said toner carrier to a developing position facing said image carrier, while rotating in a predetermined rotation direction; and

control means which moves said toner carried on said surface of said toner carrier to said image carrier, to thereby visualize said electrostatic latent image with said toner and accordingly form an image, wherein:

said control means forms a patch image within an area of said surface of said image carrier which faces a predetermined area on said toner carrier at said developing position, and controls said image forming condition based on an image density of said patch image.

18. (original): The image forming apparatus of claim 17, wherein said control means applies an alternating voltage upon said toner carrier and makes said toner carried by said toner carrier transfer toward said image carrier.

19. (original): The image forming apparatus of claim 17, wherein said toner carrier is disposed facing said surface of said image carrier with a predetermined gap from said surface of said image carrier.

20. (original): An image forming method in which while feeding a surface of an image carrier on which an electrostatic latent image is formed to a predetermined developing position, toner carried on a surface of a toner carrier is transported to said developing position, said toner is made move to said image carrier, and said electrostatic latent image is visualized with said toner, said method comprising the steps that:

an image forming condition is controlled based on an image density of a patch image which is formed in a patch image area on said image carrier; and

while said patch image area moves passed said developing position, said toner carrier rotates one round or more.

21. (original): An image forming method in which while feeding a surface of an image carrier on which an electrostatic latent image is formed to a predetermined developing position, toner carried on a surface of a toner carrier is transported to said developing position, said toner is made move to said image carrier, and said electrostatic latent image is visualized with said toner, said method comprising the step that:

a patch image is formed in an area within said surface of said image carrier which faces a predetermined area on said toner carrier at said developing position, and an image forming condition is controlled based on an image density of said patch image.

22. (original): An image forming apparatus, comprising:

an image carrier which has an endless shape and rotates in a predetermined direction, to thereby transport an electrostatic latent image which is carried on a surface of said image carrier to a predetermined developing position;

a toner carrier which rotates in a predetermined direction while carrying toner on a surface of said toner carrier, to thereby transport said toner to said developing position; and

control means which moves said toner carried on said toner carrier to said image carrier, to thereby visualize said electrostatic latent image with said toner and accordingly form a toner image, wherein:

while a density control factor, which influences an image density, set to be variable over multiple levels, a patch image is formed at each level of said image forming condition, said density detecting means detects toner densities of said patch images, and said density control factor is optimized based on the detection results; and

under at least one selective image forming condition among said multiple levels of said image forming condition, said patch image is formed covering all of a plurality of detection areas which are at mutually different positions on an outer circumferential surface of said image carrier in a circumferential direction of said image carrier, each one of said plurality of detection areas

has a length which corresponds to a circumferential length of said toner carrier in a patch length direction which corresponds to a direction in which said image carrier moves, and toner densities within said detection areas are detected, and a toner density of said patch image is calculated.

23. (original): The image forming apparatus of claim 22, wherein under said selective image forming condition, an average value of toner densities at mutually different detection positions obtained from the detection results within one of said plurality of detection areas is used as a toner density of said patch image within this detection area.

24. (original): The image forming apparatus of claim 23, wherein under said selective image forming condition, an average value of toner densities found in said detection areas is used as a toner density of said patch image.

25. (original): The image forming apparatus of claim 24, wherein said detection areas are disposed at equal intervals within a range of length which corresponds to a circumferential length of said image carrier.

26. (original): The image forming apparatus of claim 22, wherein said patch image formed under said selective image forming condition is formed by a plurality of patch fragments which respectively correspond to said detection areas.

27. (original): The image forming apparatus of claim 22, wherein under said selective image forming condition, said patch image has a strap shape which continuously extends in said patch length direction and entirely covers said plurality of detection areas.

28. (original): The image forming apparatus of claim 22, wherein a circumferential length of said image carrier is an integer times as long as a length which corresponds to said circumferential length of said toner carrier.

29. (original): The image forming apparatus of claim 22, wherein said selective image forming condition is a low-density side image forming condition which makes an image density the lowest among said multiple levels of said image forming condition.

30. (original): The image forming apparatus of claim 22, wherein said surface of said image carrier is formed by a photosensitive member, said electrostatic latent image is formed as a surface of said photosensitive member is exposed with a light beam.

31. (original): The image forming apparatus of claim 22, further comprising bias applying means which applies a predetermined developing bias upon said toner carrier, wherein said developing bias is used as said density control factor.

32. (original): The image forming apparatus of claim 22, further comprising an intermediate member which is structured so as to be able to temporarily carry a visualized toner image on said surface of said image carrier, wherein said image forming apparatus is structured so as to detect a toner density of a toner image carried as a patch image on a surface of said intermediate member.

33. (original): An image forming apparatus, comprising:

an image carrier which has an endless shape and rotates in a predetermined direction, to thereby transport an electrostatic latent image which is carried on a surface of said image carrier;

a toner carrier which rotates in a predetermined direction while carrying toner on a surface of said toner carrier, to thereby transport said toner to said developing position; and

control means which moves said toner carried on said toner carrier to an electrostatic latent image on said image carrier at said developing position, accordingly forms a toner image of said electrostatic latent image as a patch image, and controls respective portions of said apparatus are controlled based on a toner density of said patch image, wherein:

toner densities at a plurality of positions in said patch image which serve as detection areas are detected, and a toner density of said patch image is calculated based on said toner densities in said plurality of detection areas; and

each one of said plurality of detection areas has a length which corresponds to a circumferential length of said toner carrier in a patch length direction which corresponds to a direction in which said image carrier moves.

34. (original): The image forming apparatus of claim 33, wherein said patch image is formed by a plurality of patch fragments which are formed in such a manner that said patch fragments respectively correspond to said plurality of detection areas.

35. (original): The image forming apparatus of claim 33, wherein said patch image has a strap shape which continuously extends in said patch length direction.

36. (currently amended): An image forming method in which an electrostatic latent image is formed on a surface of an image carrier which has an endless shape and rotates in a predetermined direction, toner moves to said image carrier from a toner carrier which rotates in a predetermined direction while carrying toner on a surface of said toner carrier, said electrostatic latent image is visualized with said toner, and a toner image is accordingly formed, said method comprising the steps that:

while a density control factor, which influences an image density, set to be variable over multiple levels, a patch image is formed at each level of said image forming condition, ~~said~~ a density detecting means detects toner densities of said patch images, and said density control factor is optimized based on the detection results; and

under at least one image forming condition among said multiple levels of said image forming condition, in a patch length direction which corresponds to a direction in which said image carrier moves, said patch image is formed covering all of a plurality of detection areas

which are at mutually different positions on an outer circumferential surface of said image carrier in a circumferential direction of said image carrier, toner densities within said detection areas are detected, a toner density of said patch image is accordingly calculated.